Course Syllabus

Jump to Today

[Course Title] Course Syllabus

CSCI 361 Computer Architecture

Spring 2025

Instructor: Dr. Jakub Leszek Pach

email: jpach@mtech.edu

office hours: Monday, Thursday 08 – 09.30 a.m.

Other times by appointment

office location: MUS 103

lecture: MWF 10:00 – 10:50 a.m. in CBB 001

Course Description:

This course explores the design and organization of computer systems, including the instruction set and interconnection of hardware components. Topics include computer performance, assembly language programming, microprocessor architecture, pipeline processing(parallel computing), memory and storage organization, and multiprocessor computers. Will consist of many small programming problems.

This course is an in-person course. Adjustments may need to be made throughout the semester. Pay attention to course announcements, etc. via Canvas.

Grading:

**The final grade will be calculated based on the following components:

- **Quizzes(25%)**:
  - **Entrance Quizzes**: Short quizzes at the beginning of each class (5-10 minutes) to assess understanding of the previous material.
  - **Three Major Quizzes**: 50-minute quizzes administered throughout the semester. Each student will have one opportunity to retake each quiz at the end of the semester.
- **Assignments(75%):** Regular, individual assignments will primarily be completed during class time; however, students will have an additional 6 days to finish any unfinished work. Assignments will be graded on accuracy, quality of arguments, and timeliness.

The final grade will be calculated as a weighted average of the scores obtained in each component.**

Textbooks:

- Stallings, William. Computer organization and architecture: (10th Edition). Pearson, 2015 (or newer).
- The NASM documentation (2.16.03 or newer)

Accommodations:

Students who need any type of accommodation should work with Montana Tech Disability Services and provide appropriate documentation as soon as possible.

Academic Dishonesty:

You are encouraged to work in teams and use many resources including books and the Internet. However, each student must turn in his/her own work, and each student is responsible for understanding anything that is turned in. It is expected that the students will conduct with integrity in all course areas. Do not attempt to engage in a dishonest activity such as copying, plagiarism, falsifying information, etc. Academic Conduct. The instructor will take measures to check such instances and will submit the case to the proper authorities. Refer to the Student Conduct Code for more information regarding plagiarism and cheating.

Declaration of authorship:

I acknowledge that I have worked on this assignment independently, except where explicitly noted and referenced. Any collaboration or use of external resources has been properly cited. I am fully aware of the consequences of academic dishonesty and agree to abide by the university's academic integrity policy. I understand the importance the consequences of plagiarism.

Class Rules:

1. This course is an in-person course.
2. Attendance at every class is required.
3. Excused Absences. If there is any medical or any other kind of emergency, please let the instructor know immediately. Makeup exams will only be given if you bring a valid medical documentation.
4. **Each task without a sample required comment (below) is worth zero points.**

Comments:

There must be 4 lines of comments at the top of each source file. This heading should include your name, the class and semester, and the assignment number, and required statement. Source file without this comment gets zero points.

Template:

/*

Jakub Leszek Pach

CSCI 361 Spring 2025

Programming Assignment #1

I acknowledge that I have worked on this assignment independently, except where explicitly noted and referenced. Any collaboration or use of external resources has been properly cited. I am fully aware of the consequences of academic dishonesty and agree to abide by the university's academic integrity policy. I understand the importance the consequences of plagiarism.

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Student Learning Outcomes:

R1. Students are able to describe historical developments in computer hardware and associated performance improvements.

R2. Students are able to evaluate hardware performance and can choose the most appropriate system or hardware design given a set of alternatives. (CS: 2, 6; SE: 2, 1)

R3. Students can use and articulate the instruction set, for a specific architecture, including the different instruction formats, addressing modes and relationships to higher languages. (CS: 2)

R4. Students demonstrate how procedures, pointers and arrays are implemented in assembly and machine code. (CS: 2)

R5. Students can articulate the characteristics of a good instruction set. (CS: 2, 6)

R6. Students can research and successfully present a recent computer architecture/system not covered in lecture. (CS: 3; SE: 3)

R7. Students can articulate and demonstrate how arithmetic and logic operations are designed and implemented. (CS: 2; SE: 1, 2)

R8. Students can demonstrate the use of single cycle and pipelined datapaths and can modify them to implement additional instructions. (CS: 2, 6; SE: 2, 1)

R9. Students can describe pipelining, its associated hazards and techniques to best handle hazards. (CS: 2, 6; SE: 1, 2)

R10. Students can describe memory hierarchy, basics of caches, system buses, and how they affect computer performance. (CS: 2; SE: 1, 2)

R11. Students can describe different multiprocessor architectures. (CS: 2; SE: 1, 2)

Related Program Outcomes:

CS 2 - An ability to ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

SE 2 - An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

CS 3, SE 3 - An ability to communicate effectively with a range of audiences.

CS 6 - An ability to apply computer science theory and software development fundamentals to produce computing-based solutions.

SE 1 - An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Related ABET Program Criteria:

CS 5.a.3: Exposure to computer architecture and organization, information management, networking and communication, operating systems, and parallel and distributed computing.

CS 4.a.4: The study of computing-based systems at varying levels of abstraction.

CSCI361_Syllabus2026.pdf (https://mtech.instructure.com/courses/2998/files/601002?wrap=1) (https://

mtech.instructure.com/courses/2998/files/601002/download?download_frd=1)

Course Summary:

Date	Details	Due
Mon Jan 12, 2026	361 Checking attendance 01/12/26 (https://mtech.instructure.com/courses/2998/assignments/55218)	due by 10:50am
Wed Jan 14, 2026	361 Checking attendance 01/14/26 (https://mtech.instructure.com/courses/2998/assignments/55219)	due by 10:50am
Fri Jan 16, 2026	361 Checking attendance 01/16/26 (https://mtech.instructure.com/courses/2998/assignments/55220)	due by 10:50am
Tue Jan 20, 2026	Class02 - Command Line Basics (https://mtech.instructure.com/courses/2998/assignments/55800)	due by 11:59pm
Wed Jan 21, 2026	361 Checking attendance 01/21/26 (https://mtech.instructure.com/courses/2998/assignments/55221)	due by 10:50am
	Entrance Quiz 04 (https://mtech.instructure.com/courses/2998/assignments/56182)	due by 10:50am
Fri Jan 23, 2026	361 Checking attendance 01/23/26 (https://mtech.instructure.com/courses/2998/assignments/55222)	due by 10:50am
Mon Jan 26, 2026	361 Checking attendance 01/26/26 (https://mtech.instructure.com/courses/2998/	due by 10:50am

Date	Details	Due
	assignments/55223)	
Tue Jan 27, 2026	Class04 - DOS Interrupt for Name Printing (https://mtech.instructure.com/courses/2998/assignments/56183)	due by 11:59pm
Wed Jan 28, 2026	361 Checking attendance 01/28/26 (https://mtech.instructure.com/courses/2998/assignments/55224)	due by 10:50am
	Entrance Quiz 07 (https://mtech.instructure.com/courses/2998/assignments/56680)	due by 10:50am
Fri Jan 30, 2026	361 Checking attendance 01/30/26 (https://mtech.instructure.com/courses/2998/assignments/55225)	due by 10:50am
Sun Feb 1, 2026	Class06 - Accessing Memory Through BX Register to Print Name Using DOS (https://mtech.instructure.com/courses/2998/assignments/56537)	due by 11:59pm
	Class06 - Extra Credit: The Mirror Challenge (class 06 – Extended) (https://mtech.instructure.com/courses/2998/assignments/56538)	due by 11:59pm
Mon Feb 2, 2026	361 Checking attendance 02/02/26 (https://mtech.instructure.com/courses/2998/assignments/55226)	due by 10:50am
	Entrance Quiz 09 (https://mtech.instructure.com/courses/2998/assignments/56906)	due by 11:59pm

Date	Details	Due
Wed Feb 4, 2026	361 Checking attendance 02/04/26 (https://mtech.instructure.com/courses/2998/assignments/55227)	due by 10:50am
Thu Feb 5, 2026	Class08 - Displaying Name Based on Key Press Using DOS Interrupt (https://mtech.instructure.com/courses/2998/assignments/56831)	due by 11:59pm
Fri Feb 6, 2026	361 Checking attendance 02/06/26 (https://mtech.instructure.com/courses/2998/assignments/55228)	due by 10:50am
Mon Feb 9, 2026	361 Checking attendance 02/09/26 (https://mtech.instructure.com/courses/2998/assignments/55229)	due by 10:50am
	Entrance Quiz 12 (https://mtech.instructure.com/courses/2998/assignments/57259)	due by 11:59pm
Tue Feb 10, 2026	Class10 - Simple Calculator with Single-Digit Arguments (https://mtech.instructure.com/courses/2998/assignments/57063)	due by 11:59pm
Wed Feb 11, 2026	361 Checking attendance 02/11/26 (https://mtech.instructure.com/courses/2998/assignments/55230)	due by 10:50am
Thu Feb 12, 2026	Class10 - 16/32-bit Calculator – (Extended) (https://mtech.instructure.com/courses/2998/assignments/57213)	due by 11:59pm

Date	Details	Due
Fri Feb 13, 2026	361 Checking attendance 02/13/26 (https://mtech.instructure.com/courses/2998/assignments/55231)	due by 10:50am
Sun Feb 15, 2026	Class12 - Procedures, ASCII Input Handling, Arithmetic Operations (https://mtech.instructure.com/courses/2998/assignments/57276)	due by 11:59pm
Wed Feb 18, 2026	361 Checking attendance 02/18/26 (https://mtech.instructure.com/courses/2998/assignments/55232)	due by 10:50am
Thu Feb 19, 2026	Class14 - Procedures, Logical Operations Calculator (https://mtech.instructure.com/courses/2998/assignments/57586)	due by 11:59pm
Fri Feb 20, 2026	361 Checking attendance 02/20/26 (https://mtech.instructure.com/courses/2998/assignments/55233)	due by 10:50am
Mon Feb 23, 2026	361 Checking attendance 02/23/26 (https://mtech.instructure.com/courses/2998/assignments/55234)	due by 10:50am
Wed Feb 25, 2026	361 Checking attendance 02/25/26 (https://mtech.instructure.com/courses/2998/assignments/55235)	due by 10:50am
Thu Feb 26, 2026	Class16 - Procedures, the Stack, Arithmetic Operations (https://mtech.instructure.com/courses/2998/assignments/57872)	due by 11:59pm

Date	Details	Due
Fri Feb 27, 2026	361 Checking attendance 02/27/26 (https://mtech.instructure.com/courses/2998/assignments/55236)	due by 10:50am
Mon Mar 2, 2026	361 Checking attendance 03/02/26 (https://mtech.instructure.com/courses/2998/assignments/55237)	due by 10:50am
	#1 Big Quiz 03/02/2026 (https://mtech.instructure.com/courses/2998/assignments/58309)	due by 11pm
Tue Mar 3, 2026	Class18 - Text Encryption using Bitwise Operations (https://mtech.instructure.com/courses/2998/assignments/58157)	due by 11:59pm
Wed Mar 4, 2026	361 Checking attendance 03/04/26 (https://mtech.instructure.com/courses/2998/assignments/55238)	due by 10:50am
Fri Mar 6, 2026	361 Checking attendance 03/06/26 (https://mtech.instructure.com/courses/2998/assignments/55239)	due by 10:50am
Mon Mar 9, 2026	361 Checking attendance 03/09/26 (https://mtech.instructure.com/courses/2998/assignments/55240)	due by 10:50am
Wed Mar 11, 2026	361 Checking attendance 03/11/26 (https://mtech.instructure.com/courses/2998/assignments/55241)	due by 10:50am
Thu Mar 12, 2026	Class20 - Caesar Cipher with Bit test Operations (Linux!) (https://	due by 11:59pm

Date	Details	Due
	mtech.instructure.com/courses/2998/assignments/58501)	
Wed Mar 18, 2026	Class21 - Signed Magnitude Arithmetic (Linux!) (https://mtech.instructure.com/courses/2998/assignments/58694)	due by 11:59pm
Mon Mar 23, 2026	361 Checking attendance 03/23/26 (https://mtech.instructure.com/courses/2998/assignments/55243)	due by 10:50am
Wed Mar 25, 2026	361 Checking attendance 03/25/26 (https://mtech.instructure.com/courses/2998/assignments/55244)	due by 10:50am
Mon Mar 30, 2026	361 Checking attendance 03/30/26 (https://mtech.instructure.com/courses/2998/assignments/55246)	due by 10:50am
Tue Mar 31, 2026	Class23 - One's Complement Arithmetic (Linux!) (https://mtech.instructure.com/courses/2998/assignments/59092)	due by 11:59pm
Wed Apr 1, 2026	361 Checking attendance 04/01/26 (https://mtech.instructure.com/courses/2998/assignments/55247)	due by 10:50am
Mon Apr 6, 2026	361 Checking attendance 04/06/26 (https://mtech.instructure.com/courses/2998/assignments/55248)	due by 10:50am

Date	Details	Due
Wed Apr 8, 2026	361 Checking attendance 04/08/26 (https://mtech.instructure.com/courses/2998/assignments/55249)	due by 10:50am
Fri Apr 10, 2026	361 Checking attendance 04/10/26 (https://mtech.instructure.com/courses/2998/assignments/55250)	due by 10:50am
Sat Apr 11, 2026	Class25 - Two's Complement Arithmetic (Linux!) (https://mtech.instructure.com/courses/2998/assignments/59274)	due by 11:59pm
Sun Apr 12, 2026	Class27 - IEEE 754 Float Interpretation (windows16/32) (https://mtech.instructure.com/courses/2998/assignments/59366)	due by 11:59pm
Mon Apr 13, 2026	361 Checking attendance 04/13/26 (https://mtech.instructure.com/courses/2998/assignments/55251)	due by 10:50am
Tue Apr 14, 2026	Class29 - Square Root Using Heron's Method (FPU, NASM, CDECL) (https://mtech.instructure.com/courses/2998/assignments/59587)	due by 11:59pm
Mon Apr 20, 2026	Class31 - Caesar Cipher Using MMX (cdecl + printf) (https://mtech.instructure.com/courses/2998/assignments/60211)	due by 11:59pm